L Number	Hits	Search Text	DB	Time stamp
1	33863	mr or mre or magneto adj resist$5 or magnetoresist$5 or amr or magnetic$4 adj resist$5 or gmr$1 or spin adj valve$1 or svmr$1 or tjmr$1 or tmj$1 or g11b005/39.ipc. or tmr or mram or magnetic adj memory or magnetic adj random adj access adj memory or TJM or macro adj magnetoresist$5 or macromagnetoresist$5	EPO; JPO; DERWENT	2003/03/19 13:24
2	1330	flux near2 guid$3	EPO; JPO; DERWENT	2003/03/19 13:24
3	263944	(magnet or magnets or barkhausen or ((hard or longitudinal$4) adj2 bias$4) or mdc or domain$ or barkhaussen or popcorn or pop adj corn or wiggle)	EPO; JPO; DERWENT	2003/03/19 13:18
4	234	(mr or mre or magneto adj resist$5 or magnetoresist$5 or amr or magnetic$4 adj resist$5 or gmr$1 or spin adj valve$1 or svmr$1 or tjmr$1 or tmj$1 or g11b005/39.ipc. or tmr or mram or magnetic adj memory or magnetic adj random adj access adj memory or TJM or macro adj magnetoresist$5 or macromagnetoresist$5) and (flux near2 guid$3)	EPO; JPO; DERWENT	2003/03/19 10:53
5	55	((magnet or magnets or barkhausen or ((hard or longitudinal$4) adj2 bias$4) or mdc or domain$ or barkhaussen or popcorn or pop adj corn or wiggle)) and ((mr or mre or magneto adj resist$5 or magnetoresist$5 or amr or magnetic$4 adj resist$5 or gmr$1 or spin adj valve$1 or svmr$1 or tjmr$1 or tmj$1 or g11b005/39.ipc. or tmr or mram or magnetic adj memory or magnetic adj random adj access adj memory or TJM or macro adj magnetoresist$5 or macromagnetoresist$5) and (flux near2 guid$3))	EPO; JPO; DERWENT	2003/03/19 13:16
6	12181	(mr or mre or magneto adj resist$5 or magnetoresist$5 or amr or magnetic$4 adj resist$5 or gmr$1 or spin adj valve$1 or svmr$1 or tjmr$1 or tmj$1 or tmr or mram or magnetic adj memory or magnetic adj random adj access adj memory or DSV or TJM or macro adj magnetoresist$5 or macromagnetoresist$5).ti,ab,cim. or "360/113" or 360/313-327.33.ccls. or 428/692-693.ccls. or 338/32$2.ccls. or 324/207.21.ccls. or 324/252.ccls. or 365/171.ccls. or 365/173.ccls.	USPAT; US-PGPUB	2003/03/19 13:17
7	458	(flux near2 guid$3).ti,ab,cim.	USPAT; US-PGPUB	2003/03/19 13:18

8	123	((mr or mre or magneto adj resist$5 or magnetoresist$5 or amr or magnetic$4 adj resist$5 or gmr$1 or spin adj valve$1 or svmr$1 or tjmr$1 or tmj$1 or tmr or mram or magnetic adj memory or magnetic adj random adj access adj memory or DSV or TJM or macro adj magnetoresist$5 or macromagnetoresist$5).ti,ab,clm. or "360/113" or 360/313-327.33.ccls. or 428/692-693.ccls. or 338/32$2.ccls. or 324/207.21.ccls. or 324/252.ccls. or 365/171.ccls. or 365/173.ccls.) and ((flux near2 guid$3).ti,ab,clm.)	USPAT; US-PGPUB	2003/03/19 13:18
9	68899	(magnet or magnets or barkhausen or ((hard or longitudinal$4) adj2 bias$4) or mdc or domain$ or barkhaussen or popcorn or pop adj corn or wiggle).ti,ab,clm.	USPAT; US-PGPUB	2003/03/19 13:19
10	50	(((mr or mre or magneto adj resist$5 or magnetoresist$5 or amr or magnetic$4 adj resist$5 or gmr$1 or spin adj valve$1 or svmr$1 or tjmr$1 or tmj$1 or tmr or mram or magnetic adj memory or magnetic adj random adj access adj memory or DSV or TJM or macro adj magnetoresist$5 or macromagnetoresist$5).ti,ab,clm. or "360/113" or 360/313-327.33.ccls. or 428/692-693.ccls. or 338/32$2.ccls. or 324/207.21.ccls. or 324/252.ccls. or 365/171.ccls. or 365/173.ccls.) and ((flux near2 guid$3).ti,ab,clm.)) and ((magnet or magnets or barkhausen or ((hard or longitudinal$4) adj2 bias$4) or mdc or domain$ or barkhaussen or popcorn or pop adj corn or wiggle).ti,ab,clm.)	USPAT; US-PGPUB	2003/03/19 13:19
11	612	mr or mre or magneto adj resist$5 or magnetoresist$5 or amr or magnetic$4 adj resist$5 or gmr$1 or spin adj valve$1 or svmr$1 or tjmr$1 or tmj$1 or g11b005/39.ipc. or tmr or mram or magnetic adj memory or magnetic adj random adj access adj memory or TJM or macro adj magnetoresist$5 or macromagnetoresist$5	IBM_TDB	2003/03/19 13:24
12	10	flux near2 guid$3	IBM_TDB	2003/03/19 13:24
13	3	(mr or mre or magneto adj resist$5 or magnetoresist$5 or amr or magnetic$4 adj resist$5 or gmr$1 or spin adj valve$1 or svmr$1 or tjmr$1 or tmj$1 or g11b005/39.ipc. or tmr or mram or magnetic adj memory or magnetic adj random adj access adj memory or TJM or macro adj magnetoresist$5 or macromagnetoresist$5) and (flux near2 guid$3)	IBM_TDB	2003/03/19 13:24

* NOTICES *

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] this invention relates to a magnetic recorder and reproducing device and a magnetoresistance-effect element, and relates to a high recording density magnetic recorder and reproducing device especially.
[0002]
[Description of the Prior Art] JP,63-164406,A has the publication of the magnetic-head material using the thin film which carried out simultaneous deposition of a nickel-iron alloy and the compound.
[0003] In collection (1994) of 18th Magnetics Society of Japan academic lecture outlines 311 term, they are Co-aluminum-O and Fe-SiO2. It is indicated that a thin film shows the big electrical resistivity of 102 to 107-microhm cm.
[0004] Magnetics Society of Japan 14 (1990) 239 term has the publication of production of the ferrite thin film by the optical irradiation ferrite galvanizing method.
[0005] JP,5-334630,A has the publication of the magnetoresistance-effect type thin film magnetic head which has the back end electrode which consists of a ferromagnetic metal.
[0006] JP,4-278210,A has the publication of the magnetoresistance-effect type head using ****** which becomes the magnetoresistance-effect element which used shunt bias from the thin film of sufficiently bigger specific resistance than this magnetoresistance-effect element.
[0007] With the record-medium opposite side side of a magnetoresistance-effect element, an opposite side has the publication of the magnetoresistance-effect type magnetic head characterized by having arranged the magnetic film for magnetic field control at JP,6-325328,A.
[0008] JP,4-298810,A has the magnetoresistance-effect element arranged in a reproduction gap, and the publication of the magnetoresistance-effect type magnetic head which while consists of an insulating material and has a magnetic joint between magnetic shielding.
[0009]
[Problem(s) to be Solved by the Invention] In the Prior art, it was difficult to realize the magnetic recording medium of recording density high enough, and the magnetoresistance-effect element which acts on the reproduction section with sufficient sensitivity and a sufficient output to an external magnetic field especially, to be unable to obtain a magnetic recording medium reliable further fully, but to realize the function as a recording device.
[0010] One unit of the record section on a record medium attains to improvement in recording density with a bird clapper narrowly, and the magnetic-recording-medium reproduction section needs to be thin-smallness-ized. As a solution of such a problem, a magnetoresistance-effect element is arranged in the reproduction section of the thin film magnetic head, the method using change of the electric resistance by the magnetoresistance effect as an output carries out, and it is **********. In this case, the gap between magnetic shielding to which becoming a problem dedicates a magnetoresistance-effect element in connection with high recording density becomes narrow inevitably, and an electrostatic discharge becomes easy to occur between the electrode of (1) magnetoresistance-effect element, magnetic shielding, etc.
[0011] (2) The disclosure magnetic field from a record medium stops invading to the back of a gap, and a reproduction output declines.
[0012] The technology of preparing a flux guide so that the aforementioned disclosure magnetic field may invade into the magnetoresistance-effect film of a magnetoresistance-effect element efficiently, in order to solve the latter problem carries out, and it is **********. That is, it is a method using the magnetic head by which even the magnetoresistance-effect film formed further the TWY of the magnetic flux which consists of a soft magnetic material in the direction of back from the magnetoresistance-effect film from the opposite side of the magnetic head. However, there is a trouble also in the above-mentioned method. Although it is the flux guide which has high permeability for guiding magnetic flux efficiently and it is necessary to form a magnetic path short enough, it is very difficult conventionally in addition to a magnetoresistance-effect element, to maintain the insulation with an electrode and to form a minute flux guide. the remarkable complexity on a production process -- in addition, it is because leak of the current to a flux guide occurs, namely, the output of a magnetoresistance-effect element is reduced, if the insulation with an electrode cannot be maintained
[0013] Thus, although the composition using magnetic shielding which has a magnetic gap narrow to an opposite side as the magnetic head corresponding to high recording density or a flux guide, and the magnetoresistance-effect film arranged in a

magnetic gap is desirable, the problem has prevented and realized the flux guide or magnetic shielding which was described previously and which has low magnetic-path resistance extremely to the difficult thing in disclosure and poor insulation of the current from an electrode.

[0014] The purpose of this invention is to offer the magnetic recorder and reproducing device using the magnetoresistance-effect element which has improved the magnetic recording medium corresponding to high-density record, i.e., a sufficient output and sufficient linearity, and dielectric-breakdown-proof nature.

[0015]

[Means for Solving the Problem] The technical problem of the magnetic recording medium in this invention is in disclosure and poor insulation of the current from an electrode, and an electrostatic discharge about the flux guide or magnetic shielding which has low magnetic-path resistance extremely by the magnetic head to prevent and realize.

[0016] One of the above-mentioned The means for solving a technical problems is to constitute magnetic shielding and a flux guide from high electric resistance material. That is, since all which causes with poor disclosure of current and insulation mean that current drops off into the material which constitutes magnetic shielding and a flux guide, they are constituting these from a very high material of electric resistance, and can prevent substantially the fall of the output by disclosure of current, poor insulation, etc.

[0017] It carries out as a thin film material with conventionally high permeability, and a ****** nickel-iron-alloy film or an iron-aluminum-silicon alloy film is a metal thin film below 100-microhm cm which has low electrical resistivity extremely. Magnetic shielding is constituted from a thin film with a thickness [of such material] of 1 micrometer, and it is assumed that 50nm in thickness and the magnetoresistance-effect film of the 50 microhm cm of electrical resistivity are arranged. When magnetic shielding has the magnetic gap which is width of face of 0.2 micrometers and had arranged the magnetoresistance-effect film in the meantime, the interval of a magnetoresistance-effect film and magnetic shielding is 75nm, and needed to maintain the insulation among both by the insulator layer of this thickness conventionally. When poor insulation arises and it calculates from the above-mentioned numeric value, sheet resistance of a magnetoresistance-effect film is 10 ohms, and on the other hand, sheet resistance of magnetic shielding is 1 ohm or less, and it is because most detection current will short-circuit magnetic shielding and it will drop off.

[0018] On the other hand, in order to estimate the effect of this invention, it is electrical resistivity 104. The case where a shield is formed by the high electrical resistance materials of microohm cm is described. In this case, to 10 ohms of sheet resistance of a magnetoresistance-effect film, if it calculates like the above-mentioned example, even when sheet resistance of magnetic shielding is 100 ohms and an insulation cannot be taken, most drops off a magnetoresistance-effect film and, as for detection current, the fall of an output can be prevented.

[0019] The above-mentioned result also explains another side of this invention again. That is, since the fall of an output does not arise even if a magnetoresistance-effect film and magnetic shielding connect too hastily electrically, it is not necessary to insulate both. It considers as the composition which short-circuits the electric terminal of a magnetoresistance-effect film, magnetic shielding or magnetic shielding, and a magnetoresistance-effect element by the high resistance film rather. Thereby, a detailed magnetic path can be formed simple and the detection sensitivity to the magnetic field of a record medium can be raised by (1) magnetoresistance-effect film and magnetic shielding.

[0020] (2) When an electric terminal connects too hastily by the high resistance film, destruction by static electricity of a magnetoresistance-effect element can be prevented.

[0021] The effect to say goes up. (1) is magnetic shielding, i.e., a flux guide. In this invention, the flux guide which contacts the edge of a magnetoresistance-effect film and consists of high electrical resistance materials as a method of preventing disclosure of current further and improving ability to detect is installed. The prevention effect of an electrostatic discharge goes up by short-circuiting this flux guide with the electric terminal of the electric resistance effect element.

[0022]

[Function] record with short and high recording density, i.e., the record wavelength recorded on a record medium, and the width of face of a recording track narrow at the magnetic recorder and reproducing device which made the reproduction section the magnetoresistance-effect element which applied high resistance soft magnetic materials in this way in this invention -- realizing -- in addition -- and an electrostatic discharge can realize equipment with few high reliability

[0023]

[Example] The film which constitutes the magnetoresistance-effect element of this invention was produced as follows by the RF magnetron sputtering system. In 3mm the atmosphere of a toll of argons, to the ceramic substrate with 1mm [in thickness], and a diameter of 3 inches, the laminating of the following material was carried out and they was produced at order. The target of iron-50at% manganese, a tantalum, a nickel-20at% iron alloy, cobalt-20% platinum, copper, and chromium was used as a sputtering target. Moreover, the simultaneous spatter of the alumina chip was arranged and carried out on the iron target, and the iron-alumina mixture film was produced.

[0024] Patterning of the formation of the element on a base was carried out by the photoresist process and ion milling. Then, the base carried out slider processing and was carried in the magnetic recording medium.

[0025] Drawing is explained for the concrete example of this invention later on below.

[0026] Drawing 1 is explanatory drawing of the first example of the magnetic recorder and reproducing device which used the magnetic head of this invention. The magnetoresistance-effect film 10, the lower part, the up magnetic shielding 81 and 82, and the flux guide 11 are formed as a thin film on the base 50 which serves as the head slider 90, respectively, and a configuration

predetermined at a photoresist process is processed. It reproduces by positioning the magnetic head which consists of these to the recording track 44 on a record medium 91. Although the head for record is not drawn, a recording head can be formed on the same slider and record and reproduction can be made to perform among drawing, respectively. In a record-medium 91 top, the head slider 90 counters the opposite side 63, and is 0.2 micrometers. It counters in the state of the following height or contact, and motions relatively. According to this mechanism, the magnetoresistance-effect film 10 is set as the position which can read in the leakage magnetic field 64 the magnetic signal recorded on the record medium 91. The direction 61 of the width of recording track and the element height direction 62 are defined as a direction parallel to the opposite side 63 of the head slider 90, and respectively perpendicular.

[0027] The magnetoresistance-effect film 10 consists of a thin film which produces the magnetoresistance effect, and reproduces an external magnetic field as an electrical signal by change of electric resistance.

[0028] An electric terminal 40 detects electric resistance as voltage through current on the magnetoresistance-effect film 10. The flux guide 11 arranges an edge in contact with a magnetoresistance-effect film, and is contacted to the lower magnetic shielding 82 and the up magnetic shielding 81 magnetically and electrically. The upper part and lower magnetic shielding form the magnetic gap exposed to the opposite side 67, the back end section is closed, namely, the magnetoresistance-effect film 10, the flux guide 11, and magnetic shielding 81 and 82 form the magnetic circuit which draws the magnetic field 64 revealed from a record medium 91. When making it into 4 micrometers or less, the effect of depth of a magnetic gap of magnetic-flux guidance improves.

[0029] The flux guide 11 and magnetic shielding 81 and 82 were produced by the iron-alumina mixture film.

[0030] Drawing 2 is the side elevation of the magnetic recorder and reproducing device of this invention. The disk 95 in which the record medium 91 which records information magnetically was formed on the field is rotated by the spindle motor 93, and the head slider 90 is guided on the truck of a record medium 91 with an actuator 92. That is, in a magnetic disk unit, therefore, the reproducing head formed on the head slider 90 and a recording head approach and motion relatively in this mechanism in the predetermined record position on a record medium 91, and a signal is written in one by one, and it reads. A record signal is recorded on a medium by the recording head through a signal-processing system 94, and obtains the output of the reproducing head as a signal through a signal-processing system 94. In case the reproducing head is furthermore moved to up to a desired recording track, the position on a truck can be detected using an output [high sensitivity / from this reproducing head], an actuator can be controlled, and a head slider can be positioned. These may be plural although this view showed each the head slider 90 and one record medium 91. Moreover, a record medium 91 may record information on disk both sides. When informational records are disk both sides, the head slider 90 is arranged to both sides of a record medium.

[0031] Drawing 3 is explanatory drawing showing the first example of the structure on the field of the magnetic resistance element of the first example of this invention. The magnetoresistance-effect cascade screen 10 exposed one edge to the opposite side 37, and is in contact with the flux guide 11 in the reverse edge. Although not shown in this view, if the opposite side 67 of the flux guide 11 and the edge of an opposite side are connected with magnetic shielding too hastily magnetically and electrically like drawing 1 , magnetic-path resistance of the magnetic circuit formed along the element height direction 62 can be made low. If the vertical bias film 37 is arranged in contact with the near edge of the magnetoresistance-effect film 10 and the direction 61 of the width of recording track of the flux guide 11, magnetic-domain control of the magnetoresistance-effect film 10 and the flux guide 11 can be carried out, and it will be useful to suppression of a noise. Although the vertical bias film 37 was constituted from a film with a residual magnetization component parallel to the direction 61 of the width of recording track and the cobalt-platinum thin film which is high coercive force material was used in this example, other hard magnetism thin films or the magnetic film which carried out switched connection to the antiferromagnetic substance also has the same function.

[0032] Drawing 4 is explanatory drawing of the first example showing the cross-section structure of the magnetic resistance element of this invention. The lower magnetic shielding 82 is arranged through the lower nonmagnetic insulator layer 21 in the lower part of the magnetoresistance-effect film 10 and the flux guide 11. The up magnetic shielding 82 is similarly arranged through the up nonmagnetic insulator layer 22 in the upper part of the magnetoresistance-effect film 10 and the flux guide 11. The up magnetic shielding 82 and the lower magnetic shielding 81 are mutually joined in contact with the back end section by the side of the element height direction 62 of the flux guide 11. That is, the magnetic flux which invades in the magnetic gap which the magnetoresistance-effect film 10, the flux guide 11 and the upper part, and the lower magnetic shielding 81 and 82 form the magnetic circuit which guides magnetic flux from the opposite side 63, and the upper part and the lower magnetic shielding 81 and 82 form is efficiently detectable.

[0033] Drawing 5 is explanatory drawing of the second example showing the structure on the field of the magnetic resistance element of the first example of this invention. The function of the magnetoresistance-effect film 10, the flux guide 11, an electric terminal 40, and the vertical bias film 37 is the same as that of drawing 3 . The vertical bias film 37 and an electric terminal 40 make width of face of the element height direction 62 of the same grade as the magnetoresistance-effect film 10, and decrease disclosure of the current to the flux guide 11 further. The high resistance magnetic-domain control film 38 consists of the conductive very low antiferromagnetism film or conductive hard magnetism film represented with a nickel oxide film, and carries out magnetic-domain control of the flux guide 11.

[0034] Drawing 6 is explanatory drawing showing the second example of the cross-section structure of the magnetic resistance element of this invention. The composition of the lower part and the up magnetic shielding 81 and 82, the upper part, and the lower nonmagnetic insulator layers 21 and 22 is the same as that of drawing 4 . The magnetic flux which invades in the magnetic gap which the flux guide 11 is arranged in contact with the front end section and the back end section by the side of the element

height direction 62 of the magnetoresistance-effect film 10, the flux guide 11, the magnetoresistance-effect film 10, the flux guide 11 and the upper part, and the lower magnetic shielding 81 and 82 form the magnetic circuit which guides magnetic flux from the opposite side 63, and the upper part and the lower magnetic shielding 81 and 82 form is efficiently detectable. Moreover, the magnetoresistance-effect film 10 cannot be exposed to the opposite side 67, and can improve electric and chemical endurance.
[0035] Drawing 7 is explanatory drawing showing the third example of the cross-section structure of the magnetic resistance element of this invention. The composition of the lower part and the up magnetic shielding 81 and 82, the upper part, and the lower nonmagnetic insulator layers 21 and 22 is the same as that of drawing 4 . The magnetic flux which invades in the magnetic gap which the flux guide 11 is arranged in contact with the front end section by the side of the element height direction 62 of the magnetoresistance-effect film 10, the flux guide 11, the magnetoresistance-effect film 10, the flux guide 11 and the upper part, and the lower magnetic shielding 81 and 82 form the magnetic circuit which guides magnetic flux from the opposite side 63, and the upper part and the lower magnetic shielding 81 and 82 form is efficiently detectable. Moreover, the magnetoresistance-effect film 10 cannot be exposed to the opposite side 67, and can improve electric and chemical endurance.
[0036] Drawing 8 is explanatory drawing showing the fourth example of the cross-section structure of the magnetic resistance element of this invention. The composition of the lower part and the up magnetic shielding 81 and 82, the upper part, and the lower nonmagnetic insulator layers 21 and 22 is the same as that of drawing 4 . The magnetic flux which invades in the magnetic gap which the magnetoresistance-effect film 10 and the upper part, and the lower magnetic shielding 81 and 82 form the magnetic circuit which guides magnetic flux from the opposite side 63, and the upper part and the lower magnetic shielding 81 and 82 form is efficiently detectable. The structure in a magnetic gap is simple and can form the smaller gap section.
[0037] Drawing 9 is explanatory drawing showing the fifth example of the cross-section structure of the magnetic resistance element of this invention. The lower magnetic shielding 82 is arranged through the lower nonmagnetic insulator layer 21 in the lower part of the magnetoresistance-effect film 10 and the flux guide 11. The up magnetic shielding 82 is similarly arranged through the up nonmagnetic insulator layer 22 in the upper part of the magnetoresistance-effect film 10 and the flux guide 11. The flux guide 11 has the effect that magnetic flux invades more deeply in the magnetic gap which the upper part and the lower magnetic shielding 81 and 82 form.
[0038] Drawing 10 is explanatory drawing showing the example of the cross-section structure of the magnetic head of this invention. The composition of the lower magnetic shielding 82, the magnetoresistance-effect film 10, the flux guide 11, the upper part, and the lower nonmagnetic insulator layers 21 and 22 is the same as that of drawing 4 . The lower [up magnetic shielding-cum-] magnetic core 84 forms the lower magnetic shielding 82 and a magnetic gap, and connotes a magnetoresistance-effect film and the flux guide 11 in a magnetic gap. Furthermore, the lower [up magnetic shielding-cum-] magnetic core 84 constitutes a recording head with the up magnetic core 83 and a coil 41, and is electromagnetism.
[0039] Drawing 11 is the cross section showing an example of the production method of the magnetoresistance-effect element of this invention. Order is explained for from the process 1 to the process 10 later on.
[0040] A process 1 carries out the laminating of the lower magnetic shielding 82, the lower nonmagnetic insulator layer 21, and the magnetoresistance-effect film 12 one by one on a base 50. A process 2 forms the resist pattern 31 in a predetermined configuration using a photoresist process. A process 3 removes the portion which is not in the resist pattern 31 of the magnetoresistance-effect film 12 ********** by ion milling. A process 4 forms the high resistance soft-magnetism thin film 13. A process 5 removes the high resistance soft-magnetism thin film 13 on the resist pattern 31 and the resist pattern 31. Although not drawn drawing, an electric terminal, a magnetic-domain control film, etc. are formed. A process 6 forms the up nonmagnetic insulator layer 22. A process 7 forms the resist pattern 32 in a predetermined configuration using a photoresist process. A process 8 removes the up nonmagnetic insulator layer 21 of the portion which is not in the resist pattern 32 ********** using ion milling, the magnetoresistance-effect film 12, and the lower nonmagnetic insulator layer 21. A process 9 removes the resist pattern 32. A process 10 forms the up magnetic shielding 81. According to the above process, the magnetic circuit of magnetoresistance-effect film-flux guide-magnetic shielding whose position suited that it is simple and correctly can be formed.
[0041]
[Effect of the Invention] According to this invention, the high-density magnetic recorder and reproducing device of the magnetic head which has sufficient reproduction output and low noise figure, and high-reliability can be obtained.

[Translation done.]

* NOTICES *

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1. This document has been translated by computer.So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]

[Claim 1] The magnetic recorder and reproducing device which has the disk which has the ferromagnetic record medium which is characterized by providing the following, and which recorded the signal magnetically, and the magnetic head which detects the magnetic field which approaches the aforementioned disk in respect of opposite, and is revealed from the aforementioned record medium by the magnetoresistance-effect element. It has magnetic shielding in which the aforementioned magnetic head forms the magnetic gap exposed to the aforementioned opposite side, the aforementioned magnetoresistance-effect element is in the aforementioned magnetic gap, and the aforementioned magnetoresistance-effect element is an electric terminal. Magnetoresistance-effect film. The flux guide arranged in contact with the back end section of the aforementioned magnetoresistance-effect film.

[Claim 2] The magnetic recorder and reproducing device which the aforementioned flux guide becomes from the high resistance film which is a soft magnetism and is more than the 1000 microhm cm of electrical resistivity in a claim 1.

[Claim 3] The magnetic recorder and reproducing device which consists of a high resistance film a part of aforementioned magnetic shielding [at least] is a soft magnetism, and it is [film] more than the 1000 microhm cm of electrical resistivity in claims 1 or 2.

[Claim 4] The magnetic recorder and reproducing device with which the aforementioned flux guide connects the aforementioned electric terminal too hastily in claims 1, 2, or 3.

[Claim 5] The magnetic recorder and reproducing device which the back end section of the aforementioned flux guide connects with the aforementioned magnetic shielding too hastily in claims 1, 2, 3, or 4.

[Claim 6] The magnetic recorder and reproducing device which contacted the edge by the side of the aforementioned opposite side of the aforementioned magnetoresistance-effect film, and has arranged the flux guide in claims 1, 2, 3, 4, or 5.

[Claim 7] The magnetic recorder and reproducing device in which magnetic shielding of the aforementioned upper part and the lower part forms a closed magnetic circuit in by the opposite side and the opposite side, and the aforementioned flux guide forms the closed magnetic circuit by the aforementioned magnetic shielding, the opposite side, and the opposite side in a claim 5.

[Claim 8] Form a magnetoresistance-effect film on a base and the first resist pattern is formed on the aforementioned magnetoresistance-effect film. Carry out patterning of the aforementioned magnetoresistance-effect film with meanses, such as ion milling, and the high resistance film which forms the aforementioned flux guide, without removing the resist pattern of the above first is formed. Remove the resist pattern of the above first and the second resist pattern is formed. Patterning of other portions of the aforementioned magnetoresistance-effect film and the aforementioned quantity resistance film is carried out with meanses, such as ion milling. The production method of the magnetic recorder and reproducing device of the claims 1, 2, 3, 4, 5, 6, or 7 including the process which forms the electric conduction film which forms an electrode, without removing the resist pattern of the above second, and removes the resist pattern of the above second.

[Claim 9] The production method of the magnetic recorder and reproducing device of the claims 1 or 7 which form lower magnetic shielding, form a lower insulator layer, form the aforementioned magnetoresistance-effect film on a base, form an up insulator layer, remove a part for the aforementioned lower insulator layer, a magnetoresistance-effect film, and an up insulator layer by the back end side to the aforementioned opposite side, and form up magnetic shielding.

[Claim 10] The production method of the magnetic recorder and reproducing device of the claims 5 or 7 including the process which forms lower magnetic shielding on a base, forms a lower insulator layer, forms the high resistance film which forms the aforementioned magnetoresistance-effect film and a posterior part flux guide, forms an up insulator layer, removes a part for the aforementioned lower insulator layer, a magnetoresistance-effect film, and an up insulator layer by the back end side to the aforementioned opposite side, and forms up magnetic shielding.

[Claim 11] The magnetic recorder and reproducing device of the claim 1 which the aforementioned quantity resistance thin film becomes from a with a 5nm or more thickness [5 micrometer or less] ferrite thin film.

[Claim 12] The aforementioned quantity resistance thin film is 0.5nm in thickness. Magnetic recorder and reproducing device of the claim 1 which consists of a mixed film of a magnetic metal and a non-conductor 5 micrometers or less above.

[Claim 13] The magnetic recorder and reproducing device of the claim 1 whose depth of the aforementioned magnetic gap is 4 micrometers or less.

[Claim 14] The magnetic recorder and reproducing device of the claim 1 whose length of the depth direction of the aforementioned magnetic gap of the aforementioned flux guide is 4 micrometers or less.

[Claim 15] The magnetic recorder and reproducing device of the claims 1, 2, 3, 4, 5, 6, or 7 which have the aforementioned magnetoresistance-effect film and the magnetic-domain control means which form the aforementioned flux guide into a single magnetic domain.
[Claim 16] The magnetic recorder and reproducing device of the claim 15 whose aforementioned magnetic-domain control means are the aforementioned magnetoresistance-effect film and the magnetic film arranged to the both ends of the aforementioned flux guide.
[Claim 17] The magnetic recorder and reproducing device of the claim 16 whose aforementioned magnetic-domain control means are the antiferromagnetism films which carried out the laminating to the aforementioned magnetoresistance-effect film or the aforementioned flux guide.
[Claim 18] The magnetic recorder and reproducing device of the claim 17 whose aforementioned antiferromagnetism film is a nickel oxide film.

[Translation done.]